LIGATION OF THE INDIRECT INGUINAL HERNIAL SAC : IS IT AXIOMATIC ?

[Continued Study]

A

THESIS

for

MASTER OF SURGERY

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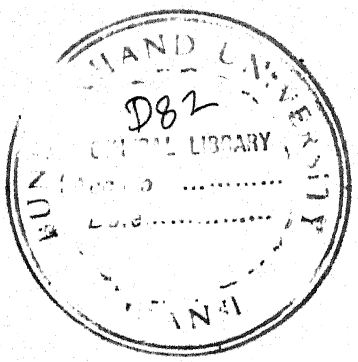

Dhiraj Prakash

C E R T I F I C A T E

This is to certify that the work entitled "LIGATION OF THE INDIRECT INGUINAL HERNIAL SAC : IS IT AXIOMATIC ? (Continued study), which is being presented as a thesis for M.S. (Surgery) by DR. DHIRAJ PRAKASH, was conducted in the department of Surgery, M.L.B. Medical College, Jhansi.

He has put in the necessary stay in the department as per university regulations.

Dated :
31/10/86

(R. P. Kala)
M.S.,
Professor and Head,
Department of Surgery,
M.L.B. Medical College,
Jhansi.

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This is to certify that the work entitled "LIGATION OF THE INDIRECT INGUINAL HERNIAL SAC : IS IT AXIOMATIC ? (Continued Study), which is being submitted as a thesis for M.S. (Surgery) Examination, 1997, Bundelkhand University, Jhansi, has been carried out by DR. DHIRAJ PRAKASH under my direct supervision and guidance.

The observations recorded have periodically checked and verified by me.

Dated :
31/10/96

(Dinesh Pratap)
M.S.,
Assistant Professor,
Department of Surgery,
M.L.B.Medical College,
JHANSI.

(GUIDE)

A C K N O W L E D G E M E N T

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Dated :
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Dhiraj Prakash

(Dhiraj Prakash)

C O N T E N T

I N T R O D U C T I O N

INTRODUCTION

Inguinal hernias are common and continue to be one of the main challenges which surgeons face. Despite the advances in surgical technology and immunology in the last ten years, we are still faced as was Celses, in the first century B.C., with patients complaining of 'Protusions of the abdominal cavity". From the patients perspective, hernia is a painful and uncomfortable disability which may prevent him working and fortunately these are relatively simple and safe to repair.

Throughout the history of modern surgery for groin hernia, several procedures have been presented with very good results, but the results have sometimes been difficult to reproduce. The relationship between the type of hernioplasty and recurrences have been a continuing matter of disagreement (Smedberg et al, 1984).

No one, however, questions the necessity for surgery where the excision of that part of the sac that traverses the abdominal wall, back to the level of the parietal peritoneum, is an essential part of any type of surgical repair (Ferguson, 1978).

Additionally, in order to prevent recurrences, the need of "high ligation" of the sac has been regarded as axiomatic. Recurrence of indirect inguinal hernia has often been shown to be due to failure of find and

extirpate the sac (Ferguson, 1978) and due to various techniques of hernial wall repair. Recurrence rates continue to range between 1 and 10% (Lichtenstein, 1987). Impersonal reviews indicate that the recurrence rate remains excessively high and fairly constant whatever method and material is employed.

The question at issue is whether, after the proximal sac is excised, the resulting peritoneal defect at the level of the parietal peritoneum should be closed by suture i.e. should ligation of the hernial sac be done routinely in every case of whether simply excising the proximal sac and leaving the resulting defect open would make any difference in post operative pain and recurrence rates ?

If it can be proved that simply excising the hernial sac leads to no significant changes in the redurrence rates, then an unnecessary procedure which was hitherto being done can be omitted with the additional advantage of a significant reduction in the postoperative pain.

What remains after excision of the sac is a peritoneal defect. It has been demonstrated in animal studies and in clinical experience that the closure of laparotomy wounds without suture of the peritoneum has not affected healing. Clinical observations show that

raw peritoneal defects heal rapidly (Ellis and Heddle, 1977). If leaving the peritoneum open makes no difference to abdominal wound healing then an unnecessary routine can be given up and therefore, also ligation of the hernial sac.

The hernial sac consists of a single layer of mesothelium. It is unreasonable to assign a crucial role to a structure of such insignificant strength in the repair of adult inguinal hernias. Co-existent fascial deficiency has been shown to always precede peritoneal protusions (Lichtenstein, 1987). These findings suggest that peritoneum in recurrent hernias is nothing more than a passive space filler.

Traditional methods of hernia repair have varied little since the first description by Bassini. In 1884, he performed the first true inguinal floor reconstruction. Five years later, he documented a recurrence rate well under 10% (Sabiston Jr.), there has been little recorded since to indicate marked improvement in these results. Newer concepts, modern materials and recent experimental evidence invite re-evaluation of established surgical tenets. Despite the certainty of iconoclastic criticism, it is time to challenge some of the myths surrounding hernia repair.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

The anatomy of the abdominal wall has been subjected to exhaustive research since the early times when inguinal hernia was creating a lot of interest amongst surgeons. The early history of interest in hernia is that of the discipline of surgery.

The Egyptian papyri do not contain reference to the operative treatment of hernia but the Papyrus Ebers (1552 B.C.) recommended diet and externally applied pressure for its treatment.

Major development in the knowledge of hernial anatomy and treatment occurred during the eighteenth century. Percival Pott refuted many of the old theories of hernia and was the first to suggest the congenital origin of hernias.

Early in the nineteenth century, Cooper, Camper Scarpa and Hasselbach made important contribution in the description of inguinal hernia anatomy.

In 1801, Camper published the description of fascia bearing his name.

In 1804 and 1807, Sir Astley Cooper published his two volume work 'The Anatomy and Surgical treatment of abdominal hernia'.

In 1814, Hasselbach described the triangle bearing his name.

The nineteenth century also brought haemostasis anaesthesia and antisepsis which made modern surgery possible.

In 1871, Marcy of Boston stressed the importance of transversalis fascia in the repair of inguinal hernia.

Wide acceptance of the operation consisting of ligature and excision of the sac and suturing of the pillars around the cord to reduce the size of the ring, was attained (Czerny, 1877).

It was Bassini who in 1884, developed a technique for reconstruction of the inguinal floor with transposition of the cord. His operation included high ligation of the sac and reinforcement of the floor of the canal by suturing the transversalis abdominis aponeurosis to the inguinal ligament beneath the cord.

The importance of the posterior inguinal wall in etiology and repair of hernias was also advocated by Harrison (1883-1962), Clark and Hashimoto (1946), Donald (1948), Griffith (1959), Condon (1964), Nyhus (1964) and Howard (1974).

In the last two decades, the physiology of repair and the mechanics of sutures and materials have been revolutionised.

Glassow (1965) reported in a study embracing 18,400 indirect hernia repairs that 'high ligation of an

indirect inguinal sac at the internal ring is traditional in both training and practice of the abdominal surgeon. Nevertheless, our experience here suggests that this is not necessarily of sole or even paramount importance in dealing with indirect hernial sac."

Ferguson (1978) reported his experience of NON-LIGATION of the hernial sac. For the last 13 years he has not sutured any of the hernial sacs. Though a formal follow up study has not been made, he checked results in 34 conseucitve patients with previously untreated indirect inguinal hernias he had operated on during 2 years. Ages ranged from 5 months to 84 years. Eight patients were followed less than one year without recurrence. One of the 26 patients followed 1 to 7 years had a recurrence. Thus no obvious increase in recurrence rates took place in such patients.

Although NON-LIGATION of the hernial sacs has been practised for many years, the first controlled study by Smedberg et al (1984), verified earlier observation as to the safety of the method. They compared 57 patients with indirect inguinal hernia in whom the sac was ligated with 53 similar patients whose sacs were left open. There was no difference in the recurrence rates.

	No. of patients	Mean age (years)	S.D.
Non ligated	53	43.5	12.6
Ligated	57	43.9	11.7
TOTAL	110	43.7	12.0

Their selected patients were randomised into two groups. In one group, the herniectomy was performed without ligature of the neck of the sac and in the other group, the herniectomy was done with a transfixed high ligature of the neck. In both groups, repair was made according to the following criteria :

a. When there was no widening of the deep inguinal ring, no repair was made.

b. When a small or moderate widening of the deep inguinal ring was present a fascia transversalis repair according to Marcy was made.

c. When the defect was large, a Cooper's ligament hernioplasty according to Mcvay was made.

It was suspected that since needle puncture of peritoneum causes some pain a ligature which creates ischaemic necrosis might increase postoperative pain. When examined two weeks postoperatively there were 5 with severe pain in the ligated group and none in the

non ligated group. After 6 weeks 20 of the ligated patients still suffered moderate pain contrasted in 5 in non-ligated. No complications such as bleeding were reported in either groups.

Clinical findings two and six weeks postoperatively.

	Non-ligated	Ligated
Two weeks postoperatively		
Total number	50	55
Moderate pain	20	22
Severe pain	-	5
Recurrences	-	-
Six weeks postoperatively		
Total number	43	49
Moderate pain	5	20
Recurrence	-	-

In postoperative herniography no difference in recurrence rates was observed.

To add to the above experience, Lichtenstein Hernia Institute's series performed approximately 6321 hernioplasties prior to 1985. From 1970 to 1985, a Bassini type variation with polypropylene mesh was employed. Almost 50% of the hernias were indirect and the sacs were not ligated in any of these. Treatment of the internal ring consisted of reconstruction. The

completely freed up hernial sac was rarely trimmed unless it was huge and unwidely . Instead the open sac was simply returned to the peritoneal cavity without suture ligation and excision. The recurrence rates in the series was 0.7% suggesting that the omission of high ligation of the hernial sac had no apparent adverse effect on results. Nor was there any increase in the incidence of haemorrhage, wound infection and other complications. The need for analgesics to allay post operative was not studied.

There was 6321 cases in this study and 5752 were observed by physical examination for a period of ranging from 2 to 14 years for a total of 46,016 years of follow up (mean 8 years), thus a total of 91% follow-up. Ages of patients ranged from 14 to 96 years and male patients predominated.

Hecker, Ring-Mrozik (1987) presented a paper with result of follow-up of operations in paediatric patients with indirect inguinal hernia 2801 patients were operated upon and high excision of the hernial sac plus 'Crude sutures' were applied in repair. No ligation of the hernial sac has been mentioned in the study. In comparison with this procedure, the standard Bassini technique produces poorer results as regards recurrence, testicular atropy and secondary maldescent. The mortality of elective herniotomy was 0.016% in this series.

PERITONEAL DEFECTS AND REGENERATION

Some workers (Robbins and others, 1949, Williams, 1955) considered that regeneration of the mesothelial lining of the peritoneal wound takes place by metaplasia of the subperitoneal fibroblasts while others (Cameron and De, 1957; Johnson and Whitting, 1962) considered mesothelial cells are detached from the adjacent intact peritoneum and become implanted on the wound surface where they proliferate and eventually give rise to a continuous sheet of mesothelial cells.

Johnson and Whtting (1962) studying the healing of defects in the parietal peritoneum of the rabbit, described a process similar to that found by Cameron and his co-workers in the rat during the healing of wounds of Glisson's capsule. They concluded that the cells which appeared rapidly on the surface of the exudate and completely covered it within 3 days had become detached from normal peritoneum in contact with the wound.

Ellis and other (1965) and Hubbard and others (1967) have shown that healing occurs in 5-6 days in case of parietal peritoneum and Glucksman (1966) has shown that the visceral mesothelium covering the terminal ileum heals in 5 days while Eskeland (1966) has demonstrated that regeneration of the mesothelial layer of parietal peritoneum is not complete until 8 days. With

the exception of Eskeland these investigators have used flattening of the surface layer of cells as a criteria for mesothelial regenerations, whereas Eskeland has used Hautchen preparations. Raftery has confirmed the finding of Eskeland that the parietal peritoneum of rat is healed within 8 days. The study was not able to support the theory that peritoneal macrophages are transformed into mesothelial cells via fibroblasts. The results obtained suggest that the new mesothelial layer is derived directly from the subperitoneum fibroblast.

Ellis et al (1965) reported their findings of healing of peritoneum under normal and pathological conditions in normal rats and guinea pigs. Ellis et al found that parietal peritoneum defects in normal adult rats and guinea pigs heal rapidly a continuous layer of flattened cells forming simultaneously over the whole surface of the defect within 3-5 days. The new mesothelium develops at the same rate in the centre of large 2 x 2 cms defects as in small ones (0.5 x 0.5 cms).

Eskeland (1964) , Ellis (1965) and Raftery (1973) among others, have experimentally demonstrated the very rapid healing of peritoneal defects. The whole surface regenerates simultaneously and the healing is complete in about one week. Clinical experience also confirms the ability of the peritoneum to heal even large defects after colorectal surgery with only scanty

development of adhesions (Trimpi, 1952).

Raftery (1973) reported his finding on the regeneration of parietal and visceral peritoneum. Raftery made a light microscopical study on the regeneration of parietal and visceral peritoneum. When conventional histological sections cut perpendicular to the wound surface, are examined it is easy to see how investigators using this method alone have formed the opinion that mesothelial regeneration occurred when the surface cells become flattened. However, when hautchen preparations are examined the absence of incompleteness of silver lines shows that these flattened cells are not in contact with one another as in normal mesothelium. Only when the silver lines are regular and complete as in normal mesothelium, can regeneration be considered to have finished and this does not occur until sometime after the surface cells becomes flattened. The healing of visceral peritoneum has been found to differ little from the healing of parietal peritoneum. The one difference is that wounds of the liver capsule appear to heal more rapidly than either caecum or parietal peritoneum. Healing has been found to occur rapidly and form the most part without adhesion formation. Parietal peritoneum and caecum are covered by a new mesothelial membrane in 8 days while the liver is covered in 7 days. The new mesothelial layer is derived directly from the subperitoneal fibroblast.

These findings are confirmed by Robbins, Brunchwig and foote (1949), Johnson and Whitting (1962), Ellis, Harrison and Hugh (1965), Eskeland (1966), Hubbard, Albites and Hricks (1967).

Harold Ellis and Robert heddle (1977) reported a prospective randomised study. Closure of vertical laparotomy wounds was randomised between a one layer technique of continuous catgut to peritoneum and continuous nylon to sheath and a one layer technique in which the peritoneal suture line was omitted. In 162 two layer closures there was 4 burst abdomens and 7 wound hernias (6.8% wound failures); in 164 one layer closures there were 5 burst abdomens and 7 hernias (7.3% failures). Of 21 patients in this series with jaundice of abdominal wounds dehisced in 3 and 4 patients developed incisional hernias (33.3% failures) compared with a 5.2% failure rate in the 305 non-jaundiced patients ($p < 0.01$). Closure of the peritoneum as a separate layer as widely advised and practised, appears to play no significant role in the healing of the laparotomy wound. There was no increase in wound ruptures or incisional hernias. Thus, they failed to reveal any obvious differences between the healing of laparotomy wounds with the peritoneum sutured or left open. Nor have they observed in those patients coming to post mortem or later re-exploration, any noticeable differences in the incidence of adhesions to the laparotomy wounds. Comparable results have been

observed in their rabbit experiments. Based on these experiments they concluded that closure of the peritoneum has little relevance to the subsequent strength of the laparotomy scar.

Karipineni et al performed animal studies to show the effect of not closing the peritoneum in abdominal laparotomies. 18 adult beagle dogs underwent xiphoid pubis midline incision under general anaesthesia. In 9 dogs fascia and peritoneum were closed in a single layer and in 9 dogs the peritoneal edges were dissected free and the fascia alone was closed. All closures were made with No. 0 chromic catgut with interrupted sutures. Three from each group were sacrificed at 3 and 6 weeks and 6 months. Of the dogs in which fascia and peritoneum were closed three had no weakness or hernia, three had weakness and three had hernias developed. Of the dogs in which fascia only was closed, six had no weakness or hernia, two had weakness and one hernia developed.

The importance of closing the peritoneum on the abdominal midline incisions to prevent postoperative hernias and adhesions is generally accepted. Surgeons have been compulsive about reperitonealizing abdominal walls and viscera, even if this entails the use of significant amounts of foreign body materials, often resulting in tension and ischaemia. Deperitotnealized surfaces per se are not the cause of adhesion formation. Serosal

defects heal not by proliferation from the cut edges but rather by free floating peritoneal macrophages which implant uniformally on the exposed surface and which then heal from the base.

Ferguson (1978) in a special comment about non ligation of the hernial sac analysed its effects. He observed that small abdominal drain sites do not commonly herniate. The peritoneal layer in abdominal incisions if it has not been separated is well closed by approximation of the transverse layer. Separate suturing of peritoneum is unnecessary. The absence of any sutures presented to the viscera probably reduces adhesions which are rarely found to involve such wounds on re-exploration. Ventral hernias seldom occur after this type of closure and are practically always due to wound infection.

As part of laparotomy for staging of lymphomas, Ferguson made bilateral 3 cms muscle splitting inguinal incision, stretched somewhat by retraction, in many patients for biopsy of iliac nodes. The peritoneum was never sutured, and only rarely were one or two sutures placed in the external oblique aponeurosis. Wounds for the most part were closed merely by taping the skin. All patients were followed closely and no herniation was observed in any of them. Re-exploration of the abdomen in five of these patients after 3 to 42 months showed no defect at the sites of the groin incisions. Emphasis on

ligation or suture of the base of peritoneal sacs therefore occurs misplaced and should be redirected towards complete excision of the peritoneal tract passing through the abdominal wall.

Peacock (1984) has emphasised that "One of the most certain way to interfere with normal healing of peritoneum is to inset sutures", which is precisely what sac ligation does. Further while some of the reluctance may be justified by notion that dehiscence would be more certain surgeons throughout the world know of no data or evidence that this is true.

When first considering leaving the hernial sac open and thus peritoneal defect, most surgeons express considerable anxiety. Yet all surgeons have experienced the frustation of trying to suture a spider web thin sac in an obese adult only to have it tear and create a larger hole with each stick of the needle. In such cases the incompletely ligated sac is simply left behind partially open . No ill effects result (Shulman et al, 1987).

The role of the peritoneum in the healing of abdominal incision still creates a lot of discussions amongst surgeons and its actual role in healing still warrants further controlled trials although many studies have been done.

Hernias simply defects in the musculofascial polanes and therefore by definition efficient fascial

healing is sufficient to prevent the occurrence of hernia. For optimal fascial healing good approximation of the fascia is essential. Closure of the peritoneum should prevent omentum and other intraperitoneal contents from lodging between the sutures of the fascial closure and thus, it seems a logical part of the abdominal closure.

However when peritoneum and fascia are closed together, good apposition of the fascial edges is often not obtained. This is specially true when a large amount of preperitoneal fat is present which almost unavoidably finds its way between loops of the suture and the fascial edges. Moreover if the peritoneum is closed, often a good purchase of the fascial edges cannot be obtained because the closed peritoneum precludes direct vision of the viscera specially in incisions above the umbilicus. If the peritoneum purposely is ignored and the surgeon is free to concentrate on a good approximation of the fascial planes, the conditions for the formation of a strong fascial scar are better satisfied(Karipineni and Wilk, 1976). They concluded that fibroblasts are important in rapid reforming of peritoneal membrane and healing is unaffected by diabetes or heavy cortisone dosage.

INGUINAL HERNIA : ETIOLOGY AND REPAIR

In the repair of hernias it is essential to define the structural elements involved. Halverson and MC Vay have admitted that "Transversalis fascia is loose

areolar tissue with very little tensile strength while aponeurosis is a flattened tendon with great tensile strength." Condon has agreed that transversalis fascia" possesses little intrinsic strength and by itself is a worthless material as far as the construction of a sound hernia repair is concerned.

Why should one attempt to reconstruct the normal anatomic structures when the mere presence of a hernia already at least to the deficiency of the canal floor ? The groin is the only area of the abdominal wall that is not supported by a musculotendinous barrier (Lichtenstein, 1987). This is unique to man who in the evolutionary processes learned to walk upright thus creating an abdominal Achilles heel or Hasselbach's triangle, protected only by transversalis fascia. The use of transversalis fascia for reconstruction of the normal anatomic structure was an understandable outgrowth of investigations that examined the inguinal region from the preperitoneal aspect. This invited the conclusion that groin hernias could be cured by closing the defect in the transversalis fascia. Fascia, however, is merely connective tissue of little intrinsic strength and must be differentiated from collagen rich aponeurosis. It is the latter that provides the true support to the abdominal wall.

Normally, increases in intra-abdominal pressure

are counteracted in the groin by the shutter mechanism. This physiologic action approximates the arching fibres of the transversus abdominis tendon to the inguinal ligament during exertions, the weak transversalis fascia is thus reinforced. It is only when the butterssing action of this musculotendinous barrier fails that herniation occurs. It is noteworthy that, since the time of Bassini, virtually all technics described have incorporated the musculotendinous arch above the groin rather than relying solely on transversalis fascia. This produces physiologic restoration rather than mere anatomic reconstruction of weak tissue by the construction of a strong canal floor.

The myths surrounding hernial repair and the importance placed on ligating the sac as a part of repair has now been challenged and explained by many surgeons. In the repair of hernia it is essential to define the structural elements involved.

Halverson and Mc Vay (1970) have admitted that transversalis fascia is loose areolar tissue with very little tensile strength while aponeurosis is a flattened tendon with great tensile strength, Condon has agreed that transversalis fascia "possesses little intrinsic strength and by itself is a worthless material as far as the construction of a sound hernial repair is concerned.

The notion that factors other than the presence of a congenital patient peritoneal sac are responsible

for some indirect inguinal hernias is supported by the observation that some indirect hernais do not appear until relatively late in life. In addition analysis of autopsy and surgical statistical data suggests that as many as 20 percent of males have a patent sac that persists well into adult years without the appearance of a typical inguinal hernia (Conner and Peacock, Jr, 1973).

Since tissue insufficiency can occur on either side of the epigastric vessels, it is not surprising that the incidence of indirect and direct hernias in the adult are approximately equal. Interestingly, 50% of all recurrences in carefully documented series are of the indirect variety. These findings do not support the concept that simple sac ligation and internal ring reconstruction are all that is indicated in indirect hernia repair. It is convenient to speculate that the original surgeon missed the sac, a fact apparently substantiated by the presence of a peritoneal sac in all indirect recurrences. However, Peacock and Meddel (personal communication), have shown that a fascial defect always precedes peritoneal protusions(Lichtensten, 1987).

The hernial sac consists of a single layer of mesothelium. It is unreasonable therefore, to assume that it plays a crucial role in the genesis or repair of adult inguinal hernias. Although a patient processus vaginalis exists in almost all animals man is the only

animal prone to herniation. Co-existence of fascial deficiency must therefore be a prerequisite before clinical protusions appears.

Therefore, repair of the fascial defect appears to play the most important role in hernial repair rather than placing an unduly high importance on ligating the hernial sac.

It is of great value to know that the indirect inguinal hernial sacs can be resected, extirpated and not ligated without the occurrence of a decline in the quality of the operation as far as risk of recurrence is concerned. On the contrary there seems to be slight but significant reduction of discomfort mainly in the form of pain in the post operative period. This knowledge can be very useful specially in patients with fragile hernial sacs that rupture very easily during dissection and when stretched to enable a high ligature. While the surgeon tries to mend the peritoneum there are obvious risks of consequent bleeding from the epigastric vessels and accidental sutures in the bowel.

Ferguson has noted that "the excision is more complete and more rapid when no ligature or suture is contemplated.

A further theoretical advantage can be the elimination of difficulties associated with handling the peritoneum in sliding hernias, with the non ligature method.

Rectus sheath near inguinal hernia in adults was found to be thinner than normal.

Specimens from patients with hernia weighed lesser than the normals.

This decrease in weight correlated well to the decrease in hydroxyprolene(collagen) content (Sabiston).

Fibroblast on culture showed a 50% less proliferation.

A reduction in collagen synthesis has been implicated as an etiology in the synthesis of hernia.

PERITONEUM AND PAIN

The peritoneum is a highly innervated, sensitive membrane in which even puncture with a fine needle produces a sensation of pain. Thus, a ligature causing ischaemia and necrosis is very likely to increase post-operative pain. The consequence of peritoneal suturing on postoperative symptoms have not been previously investigated.

Smedberg et al (1984) showed a controlled randomized study that pain was definitely less in the group where ligation of the sac was not done as compared to the group where ligation of the hernial sac was done.

POST OPERATIVE COMPLICATIONS

Traditional methods of hernia repair have varies little since the first description by Bassini more than

ninety years ago. In 1884, he performed the first true inguinal floor reconstruction. Five years later he documented a recurrence rate well under 10%. There has been little recorded since to indicate marked improvement in these results (Lichtenstein and Manny shore, 1987).

Wantz (1984) reported the incidence of complications in inguinal hernial repairs. The report is based on personal experience with 3028 groin hernioplasties. Though various procedures were performed the most common complication is recurrent herniation. Patients with bilateral inguinal hernias have a much greater chances of recurrence than patients with a unilateral hernia. Among the primary Shouldice herniaplasties which he performed personally there were 23 known recurrence in 20 patients. Fifteen of the 20 patients had a hernia, a hernia plasty or recurrent hernia on the other kside. This high percentage of recurrence following Shouldice hernioplasty was reported to be due to poor tissues.

Moschinski and Linke (1986) gave a report of inguinal hernia operations in Germany. There are not exact figures for the frequency of recurrence of hernia after an inguinal hernia operation. Bassini method is still the one most often carried out. Lately, however, the Shouldice procedure has been increasingly used. Haematoma is the most frequent post operative complication.

Peacock and Cannon and Read (1981) have demonstrated defective collagen in patients with direct inguinal herniation. Other complications like ischemic architis and testicular atrophy, haematomas, numbness and parasthesia in the groin, groin pain and sexual dysfunction are only occasional.

MATERIAL AND METHODS

MATERIAL AND METHODS

SELECTION OF CASES

Patients attending the out patient department complaining of hernial projection were examined. Patients who were otherwise healthy except having indirect inguinal hernia and were between 5 to 60 years were selected for the study.

Patients who were not selected for the study included :

- Females
- Age below 5 years and above 60 years.
- Bilateral hernias.
- Direct hernias.
- Recurrent hernias.

PROCEDURE

At operation, the diagnosis of indirect hernia was confirmed and patients with selection criteria were only taken for the study. Thus, the finding at operation was the final point of selection.

Selected patients were operated by standard inguinal approach with division of sac in each case at the neck. No attempt was made to transfix the neck. The peritoneum was then allowed to fall back and a standard Bassini's repair using 2/0 prolene was done in each case.

POST OPERATIVE MANAGEMENT

Postoperatively, no special precautions were taken. No tight strapping of the operation site was done and mobility was commenced at the earliest. The post operative pain was assessed by the following criteria :

- Mild pain - no analgesic required.
  Moderate pain - oral analgesic required.
  Severe pain - Injectible analgesic required.

During the stay of the patients in the hospital they were also observed for any immediate prolapse of the abdominal contents, a local bulge, haematoma, wound infection of any other complication.

Patients were followed up for period of one year of study and those who turned up were observed for any recurrence of hernia.

O B S E R V A T I O N S

OBSERVATIONS

A total of 10 patients between 5 to 60 years of age with unilateral indirect unguinal hernia admitted in the surgical ward of M.L.B. Medical College, Hospital, Jhansi during the period from July, 1995 to August, 1996 were treated with herniorrhaphy. The indirect inguinal sac was completely separated, excised but no transfixation of the sac was done. No controls were taken in the present study.

I. AGE AND SEX DISTRIBUTION

TABLE I : Distribution of patients according to age and sex.

Age groups (years)	No.of cases	Percentage	Sex		Mean age (years)
			M	F	
0 - 10	1	10.00	1	-	
10 - 20	1	10.00	1	-	
21 - 30	1	10.00	1	-	
31 - 40	5	50.00	5	-	33.7
41 - 50	1	10.00	1	-	
51 - 60	1	10.00	1	-	

The mean age of the patients in present study was 33.7 years. All the patients were males.

II. TYPE OF HERNIA

TABLE II : Distribution of patients according to type of hernia.

Type of hernia	No.of cases	Percentage	Side	
			Right	Left
Direct	-	-	-	-
Indirect	10	100.0	8	2

All patients had indirect inguinal hernia. Eight (80%) patients had right side hernia and remaining 2 (20%) patients had left side.

III. SIZE OF NECK (As determined by Deep Ring)

TABLE III : Distribution of patients according to size of neck.

Widening of Neck	No.of cases	Percentage
No	-	-
Small or moderate	9	90.00
Large	1	10.00

The size of the deep ring was assessed at operation. All but one patient in the present study had a small or moderate size of the deep ring.

IV. TYPE OF OPERATION

TABLE IV : Distribution of the patients according to type of operations.

Type of operation	No.of cases	Percentage
Herniotomy	1	10.0
Herniorrhaphy (Bassini's type)	9	90.0
Hernioplasty	-	-

In nine (90%), out of ten patients Bassini's type repair was performed using 2/0 prolene. In the remaining one (10%) patient who was a child of eight years, only herniotomy was performed.

V. POST OPERATIVE PAIN

TABLE V : Showing the post operative pain.

Post operative day	Mild		Moderate		Severe	
	No.	%	No.	%	No.	%
1st	2	20.00	-	-	8	80.00
2nd	6	60.00	3	30.00	1	10.00
3rd	8	80.00	2	20.00	-	-
4th	9	90.00	1	10.00	-	-
5th	10	100.00	-	-	-	-
6th	-	-	-	-	-	-
7th	-	-	-	-	-	-

Pain was evaluated for 7 days following surgery. The post operative pain was evaluated as mild, moderate and severe.

Mild pain was treated with no drug, moderate pain with oral analgesics and severe pain with injectables.

Eight(80%) patients required injectables on first postoperative day and one (10%) patient on the second post operative day.

By the fifth day all patients were treated without any analgesics.

VI. COMPLICATIONS

TABLE VI : Showing the complications post-operatively.

Complications	No.of cases	Percentage
Haematoma	Nil	Nil
Wound infection	Nil	Nil
Dehiscence	Nil	Nil
Orchitis	Nil	Nil
Local surge	Nil	Nil
Others	Nil	Nil

No patient had developed any type of complication on postoperative follow up.

VII. POSTOPERATIVE STAY

TABLE VII : Showing postoperative stay.

Post operative stay(days)	No.of cases	Percentage
0 - 3	-	-
4 - 5	1	10.00
6 - 7	9	90.00

Nine (90%) patients were discharged on seventh post operative day while 1(10%) was discharged on the 5th day of surgery (Table VII).

VIII. RECURRENCE

TABLE VIII : Showing the recurrence of hernia.

Follow up period (months)	No.of cases	Percentage	Recurrence
0 - 12	6	60.00	Nil

Within the period of 12 months of study, six out of 10 patients (60%) turned up for follow up and none of them had shown any recurrence so far.

D I S C U S S I O N

D I S C U S S I O N

No abdominal surgeon disagrees with the fact that excision of the proximal part of the indirect inguinal sac is essential in the treatment of hernia (Ferguson, 1978). The patent processus vaginalis may be the only abnormality preceding herniation and the smooth peritoneal tract appears to invite visceral protrusion. The excision of that part of the sac that traverses the abdominal wall back to the level of the parietal peritoneum is an essential part of any type of surgical repair. At autopsy 20% of adult males have a patent peritoneal sac with no history of having had a hernia (Conner and Peacock Jr, 1973). Therefore a patent processus vaginalis cannot be the cause of hernia nor can its elimination per se be the cure.

Recurrence of indirect inguinal hernia has often been shown to be due to failure to find and extirpate the sac. Many have documented other reasons for recurrence. Only a few have however stressed the fact that only excision and not ligating the hernial sac cause no different recurrence rates as shown by standard randomised trials (Ferguson, 1978).

The distal part of the sac however needs not to be removed when it is so large that additional dissection would be needed.

The question at issue is whether after the proximal sac is excised the resulting peritoneal defect at the level of the parietal peritoneum should be closed by suture as had been taught and traditionally practised by abdominal surgeons or can be left as such.

The literature contains many affirmatives by experienced surgeons concerning the importance of high ligation of the hernial sacs. Some have even advocated translocating the ligated stump by suturing it to the transverse layer away from the internal ring. These surgeons properly concerned with the importance of treating the sac, apparently did not consider the alternative of simply excising it. We, at this institution, have done this though in only 10 patients with grafifying results.

AGE/SEX DISTRIBUTION

In the comparative study of 110 patients by Smedberg et al (1984), of which 57 patients were treated by non-ligation and 53 patients by ligation of the hernial sac. All patients were males under 65 years of age. Mean age was 43.5 years in the non ligated and 43.9 years in the ligated group.

In the study by Lichtenstein (1987) the total number of patients included were 6321. Ages of the patients ranged from 14 to 96 years. Male patients predominated in whom 50% had indirect and 50% direct inguinal hernias. Non ligation was done only in all

indirect hernias (50% cases).

In the study by Donald Ferguson, 34 patients were checked. Age ranged from 5 months to 84 years. All had indirect inguinal hernias. No sex preference is mentioned and all patients were treated by non-ligation.

In our present clinical study, ten patients were chosen. Age ranged between 5 to 60 years with a mean age of33.7 years. All were male patients and all had indirect inguinal hernia.

TYPE OF HERNIA

Smedberg et al performed their study in all indirect hernias.

In Lichtenstein Hernia Institute series of 6321 patients 50% patients had indirect hernia.

Donald J Ferguson performed in all patients with indirect hernia.

In our study also all patients only of indirect inguinal hernia were included.

SIZE OF NECK(AS DETERMINED BY DEEP INGUINAL RING)

In the study by Smedberg et al, patients were treated according to the following recommendations when there was no widening of the deep inguinal ring. No repair was made, when a small or moderate widening of the deep ring was present a fascia transversation repair according to Marcy was made and when the defect was large, a Coopers ligament hernioplasty according to Mc Vay was

made. In 10 cases, no repair was made because there was no widening of the deep ring. A Marcy repair was done in 78 cases and McVey repair in 16. In 6 cases, a Bassini repair was done.

In Lichtenstein series no consideration was placed on the ring and a Bassini type variation with polypropylene mesh was employed in all patients.

In the special comment by Fergusion, no mention is made of the deep inguinal ring.

In our study consideration of the deep ring was made as per the study of Smedberg et al. Nine patients chosen had a small to moderate deep ring and one of wide neck.

TYPE OF OPERATION

Smedberg made a repair according to Marcy when a small or moderate size deep ring was encountered, when the defect was large a Cooper's ligament hernioplasty was made.

Lichtenstein performed Herniorrhaphy in all 6321 patients. No specific procedure in mentioned repair was achieved by a single layer approximation of transversus abdominis ligament to pouparts liganeal.

In our study a Bassini type repair was performed in all but one patient using 2/0 prolene.

MATERIAL FOR REPAIR UTILISED

No specific material used in herniorrhaphy is mentioned in any of the above mentioned studies.

In the present study, prolene 2/0 was used for herniorrhaphy in all patients with indirect inguinal hernia.

POSTOPERATIVE PAIN

In the comparative study by Smedberg et al post operative pain was assessed at 2 and 6 weeks. It was observed that two weeks postoperatively there were no differences between the groups concerning moderate pain but in the ligated group there were five patients with severe pain compared with none in the non-ligated group, a difference that is significant.

Six weeks postoperatively there was significant difference in moderate pain amongst the non-ligated and ligated group. Five patients in the non-ligated group while 20 patients in the ligated group experienced moderate pain two weeks postoperatively.

In Lichtenstein's series, though no period is mentioned for assessment of pain yet they found a relative absence of pain postoperatively. 89.5% of the patients did not require hypodermic administration of narcotic for analgesia. Possible meaning that they have either no significant pain or a mild pain which did not require analgesics.

Ferguson did not analyse the pain.

In present study, the severity of pain was divided into mild pain requiring no drugs, moderate pain requiring only oral analgesics and severe pain requiring injectable analgesics and the pain was assessed for the first 6 days till most patients were discharged.

On the first day, 8 out of 10 patients (80%) had severe pain and they required injectable analgesics. However, 2(20%) required no analgesics.

There was dramatic change on the second day only one patient had severe pain and required injectable analgesics and rest patients experienced mild to moderate pain.

On the 3rd day 8(80%) patients had mild pain and required no analgesics and remaining two patients required oral analgesics.

On the 4th day, 9 patients had mild pain and did not required analgesics, only one patient had moderate pain and oral analgesics was given.

Then on the 5th day onwards, non complained about pain whatsoever.

POST OPERATIVE STAY

Smedberg et al did not mention about post operative stay but they have assessed period off work. They showed that the average time off work was 3.4 and 3.8 weeks in the non-ligated and ligated groups

respectively in favour of non-ligature a significant difference.

In the present study, 9(90%) patients were discharged at the end of 7th day and 1(10%) patient on 5th post operative day.

No other study has mentioned the post operative stay in the hospital.

8. COMPLICATIONS (IMMEDIATE POST OPERATIVE)

In Smedberg et al study group there was no bleeding or other complications from the non-ligated peritoneal sac. In the ligated group, there was one case of wound infection and one patient had epididymitis three weeks post operatively no sinus developed.

In Lichtenstein's series, there was no increase in the incidence of haemorrhage, wound infection or other complications.

In Ferguson series, no mention has been made of the immediate post operative complications.

In the present work, no patient has suffered from any complication.

9. FOLLOW UP AND RECURRENCE

In the study of Smedberg et al, patients were followed up for three years. They have assessed recurrence at 2 weeks, 6 weeks, at the end of one year and between 1 to 3 years.

After 2 and 6 weeks, no clinical recurrences were found in the two groups. One recurrence appeared in

each group within one year postoperatively. One year or later postoperatively, two recurrences were found in the group without ligation and one in the group with ligation.

Number of recurrences and New hernia
(Clinical and Herniographic findings.)

Findings	Number of patients	
	Non-ligated	Ligated
Clinical findings	49	54
Recurrence at		
0-1 year	1	1
0-3 years	1	1
Additional Herniographic findings		
Recurrence	1	1
New hernia	2	2

In Lichtenstein Hernia Institute' series, 91% patients were followed between 2 to 14 years. The recurrence rate was 0.7% suggesting that the omission of high ligation of the hernial sac had no apparent adverse effects on the results. Of the 43 recurrences one appeared within a year of operation. There was no evidence to suggest that unrestricted physical activity in the immediate postoperative period contributed to the development of any recurrence. Excessive tension on the suture line was the prime cause of failure.

In Ferguson series, 8 patients were followed less than one year and 26 patients were followed 1 to 7 years. He found that there was no obvious increase in recurrence rates.

In present study because of limitation of socio-economic conditions of this region only six patients could turn up in the follow up within a period of one year of study. No patient had any recurrence.

C O N C L U S I O N

C O N C L U S I O N

1. A controlled clinical study on 10 patients of indirect inguinal hernia has been conducted in the last one year.
2. We have abandoned the step of transfixation. and ligation of sac at the neck in the repair.
3. Standard Bassini's repair using 2/0 prolene was done in 9 patients.
4. One child aged 8 years even no such repair was attempted.
5. We did not encounter any post operative complication.
6. There was no recurrence seen during the period of study.
7. Possible advantages are :
   a. No chance of damaging cord structure and an attempt to do a high ligation of the sac.
   b. No chance of entrapment of abdominal contents in ligature.
   c. Lessens operative time.
   d. Less post operative pain requiring less analgesics.

Hence it can be concluded that transfixation and ligation of sac at the neck is not essential or axiomatic and can be abandone.

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M A S T E R C H A R T

MASTER - CHART

Sl. No	Studies	Age (years)	Mean age (years)	Sex	No. of cases	Type of hernia	Size of neck		
							No	Small	Large
1.	Smedberg et al	Under 45	43.5 (non-ligated) 43.9 (ligated)	Males	110 (57-NL & 53-L)	Indirect	10	78	16
2.	Lichtenstein's institute series	14-96	-	Males predominated	6321	50% (Direct) 50% (Indirect)	No consideration		
3.	Ferguson DJ	5 months-84 years	-	-	34	Indirect	No consideration		
4.	Present study	5-60	33.7	Males	10	Indirect	10	9	1

NL : Non-ligated, L : Ligated

Sl. No.	Operation done				Postoperative pain		Complication		Stay in hospital (days)	Recurrence		Followup
	NO	Marcy	Mac Vay	Bassini	N.L.	L	N.L.	L		NL	L	
1.	10	78	16	6	+ 2 Weeks		No 57	53	Off work	49	54	60 Pts. at 1 yrs.
					No 50	55	Bleeding		N.L.-3.4	0-1 yrs		
					Moderate 20	22	-	-	L. 3.8	1	1	
					Severe 0	5	Wound infection			0-3 yrs		
					+ 6 weeks		-	1		1	1	
					No 49	49	Epididynitis					
					Moderate 5	20	-	1				
							Sinuses					
							-	-				
2.	Bassini's repair				89.5% required no drugs		No increase		Not mentioned	43 (0.7%)		2-14 yrs (91%)
3.	Herniorrhaphy - (No special repair)				Not analysed		-		-	No Increase		1-7 yrs (100%)
4.	Bassini's repair				Day	Mild / Moderate / Severe	Nil		4-7 days	NIL		1 year
					1st	2 / - / 8						
					2nd	6 / 3 / 1						
					3rd	8 / 2 / -						
					4th	9 / 1 / -						
					5th	9 / - / -						
					6th	9 / - / -						
					7th	9 / - / -						

S U M M A R Y

The hernial sac does not play a crucial role in problem of hernia. Hence ligation of this sac should not be taken as a axiomatic step.

We have done about 10 cases of age between 5-60 years , where a hernial sac has not been ligated but has only been divided at the level of deep inguinal ring. The peritoneum was then allowed to fall back and a standard Bassini's repair using 2/0 prolene was done in each case. except in a child of 8 years where-ever no such repair was done.

In our study the severity of pain was divided into mild pain requiring no drugs, moderate pain requiring only oral drugs and severe pain requiring injectable analgesics. On the first postoperative day 8 out of 10, patients had severe pain and they required injectable analgesics. There was dramatic change on the second day only one patient had severe pain.

In our study there has not been any complication either on table or immediate post operative or on any occasion of the follow up. Six patients turned up inthe follow up within a year of study, no patient had a recurrence.

Possible advantages of this procedure are :

. No chance of damaging cord structure.

- No chance of entrapment of abdominal content in the ligature.
- Lessen operative time.
- Lessen post operative pain,

Hence it can be concluded that transfixation and ligation of sac at the neck is not essential or axiomatic.
